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1/77

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02 FEB 2004

The Patent Office

Cardiff Road  
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Gwent NP9 1RH

1. Your reference

03-AQP-379 (CLI)

02FEB04 186775-1 001055  
P01/7700 0.00-0402206.7 NONE

2. Patent application number

(The Patent Office will fill in this part)

0402206.7

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Eaton Corporation  
Eaton Centre  
1111 Superior Avenue  
Cleveland, Ohio, 44114-2584 USA.

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

OHIO, USA

6715122001

4. Title of the invention

METHOD AND STRUCTURE FOR RETAINING A TUBE

5. Name of your agent (if you have one)

Mr Geoffrey Clarke

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

c/o Derek Parnaby  
Eaton Limited  
Norfolk Street  
Worsley, Road North  
Manchester, M28 3ET UK

Patents ADP number (if you know it)

8595555001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

—

No

—

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
(day / month / year)

No

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

NO

- a) any applicant named in part 3 is not an inventor, or
  - b) there is an inventor who is not named as an applicant, or
  - c) any named applicant is a corporate body.
- See note (d))

# Patents Form 1/77

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Continuation sheets of this form

Description

2

Claim(s)

1

Abstract

1

Drawing(s)

3

13

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

YES

Request for substantive examination (Patents Form 10/77)

NO

Any other documents (please specify)

Cover letter

11.

I/We request the grant of a patent on the basis of this application.

Signature

Geoffrey Clarke

Date 30 January 04

12. Name and daytime telephone number of person to contact in the United Kingdom

Geoffrey Clarke tel: 07802250083

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**METHOD AND STRUCTURE FOR RETAINING A TUBE**

Field of the Invention

**[0001]** The present invention relates to holding a tube in place and more specifically holding a tube in place using a shoulder or groove formed in the tube and a holding clamp.

Background

**[0002]** The prior art teaches brazing an end form onto a cut tube end where the brazed end fitting is shaped such that a stamped metal holding clamp can engage a shoulder to hold the tube in place (see FIG. 1).

Summary of the Invention

**[0003]** The present invention provides for a retention structure for a tube using a groove formed in the tube which is used with a holding clamp to hold the tube in position.

**[0004]** In an alternative structure, a shoulder cold formed in the tube is used to hold the tube in place using a similar holding clamp (see FIG. 2).

**[0005]** In the first embodiment (FIGS. 2 and 3), a groove is cut or otherwise formed towards the open end of a fluid handling tube. The groove is sized to accept a holding clamp. The holding clamp can be made of stamped metal which has a slot formed therein to engage the groove formed in the tube. The clamp is bolted or otherwise held against a surface which in turn engages the groove to hold the tube in position on the surface so as to extend into a device (pump, motor, etc.) for fluid connection between the tube and a port formed in the device. Sealing can be effectuated with an o-ring which engages a second groove formed in the tube close to the open end of the tube.

**[0006]** The second embodiment (FIGS. 4 and 5) also provides for the retention of a tube onto a surface for extension of the tube into a device such as a hydraulic pump or motor or air conditioning system. In this embodiment, a shoulder is cold formed in



the tube towards an open end of the tube. A holding clamp is bolted or otherwise held against a surface of the device which then bears against the shoulder to hold the tube in place into a port formed in the device. For sealing of the fluid, an o-ring is fitted in an annular groove formed in the open end of the tube between the shoulder and the open end of the tube.

#### Brief Description of the Drawings

- [0007] FIG. 1 is a perspective view of a prior art tube retention structure;
- [0008] FIG. 2 is a perspective view of the tube structure of the present invention;
- [0009] FIG. 3 is a perspective view of the holding clamp of the present invention;
- [0010] FIG. 4 is a perspective view of an alternate embodiment of the tube structure of the present invention;
- [0011] FIG. 5 is a perspective view of an alternate embodiment of the holding clamp of the present invention;
- [0012] FIG. 6 is a cross-sectional view of the tube end with the retention groove and the seal groove;
- [0013] FIG. 7 is a partial cross-sectional view of the device having two bores for receiving two separate tubes and a threaded bore for a retaining bolt;
- [0014] FIG. 8 is a top view of the two bores and threaded bore of FIG. 5; and
- [0015] FIG. 9 is a cross-sectional machining drawing of the tube of the present invention showing the cold formed shoulder and seal groove of FIG. 4.

We claim:

1. A tube retainer comprising:  
a tube having an annular retention groove formed adjacent to an open end of said tube;  
a holding clamp which engages said retention groove.
2. The tube retainer of claim 1 wherein said holding clamp is a flat plate having a slot formed therein for engaging said retention groove.
3. The tube retainer of claim 1 wherein said holding clamp is attached to a device, said device having a bore formed therein for receiving said tube.
4. The tube retainer of claim 1 further comprising a second annular seal groove formed on said tube interposed between said retention groove and said end of said tube, said seal groove receiving a sealing device.
5. The tube retainer of claim 4 wherein said sealing device is an o-ring.
6. A method of retaining a tube to engage a device comprising:  
forming an annular retention groove adjacent to an end of the tube;  
forming a slot in a holding clamp to engage said annular retention groove;  
attaching said holding clamp with the tube to the device.
7. The method of claim 6 further comprising forming a seal groove between said retention groove and said end of said tube for receiving a sealing device.



03-AQP- 379 (CLI)

Abstract

A tube retainer means comprises a holding clamp in the form of a flat plate having a slot formed therein, said slot engaging a retention groove or retaining shoulder formed adjacent the end portion of the tube to be retained, said plate having additional means to enable it to be secured to a body receiving the end portion of said tube.

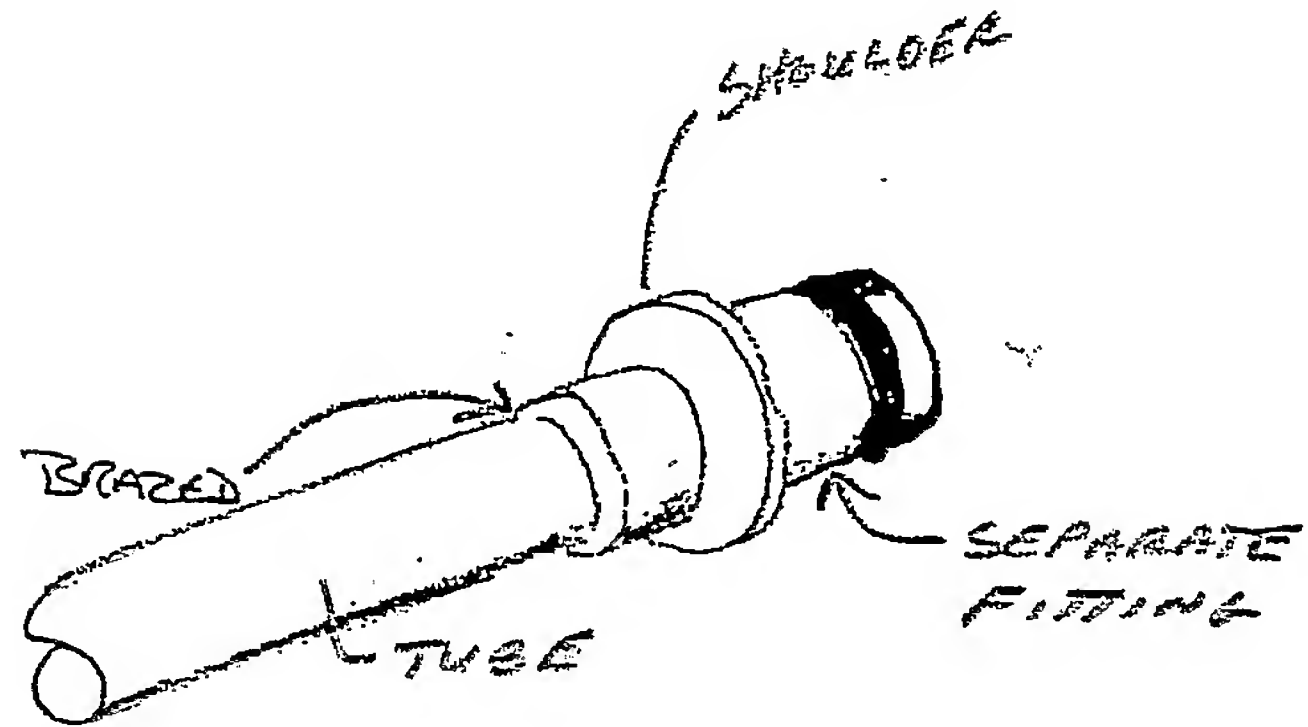


FIG. 1

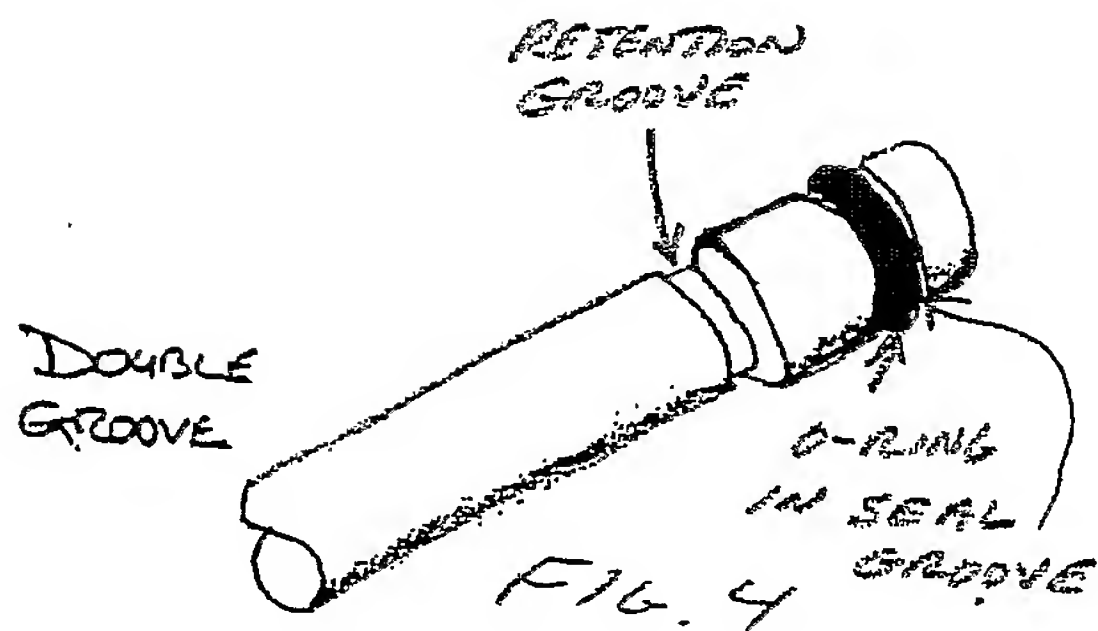


FIG. 2

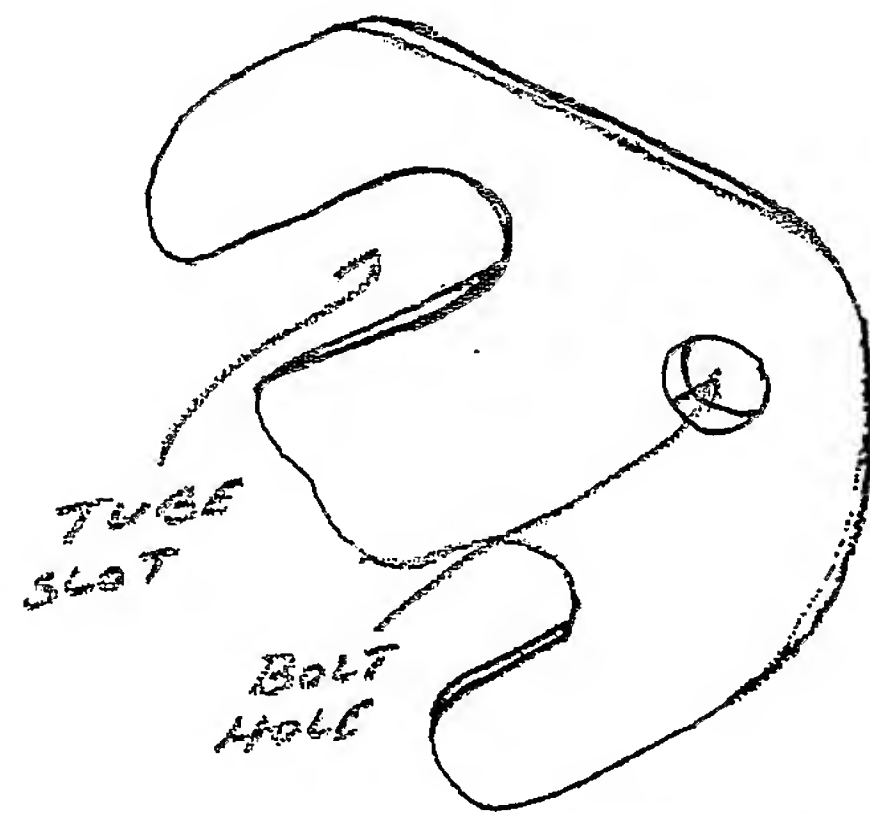


FIG. 3

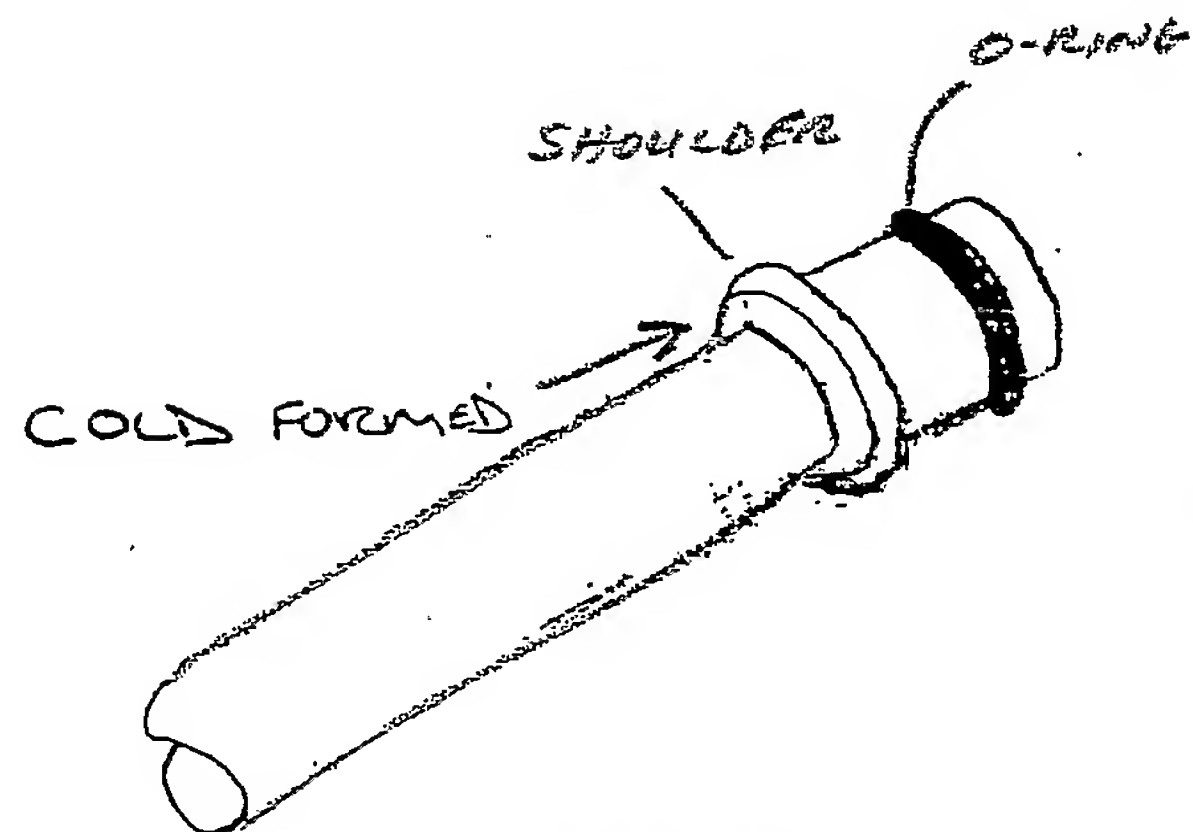


FIG. 4

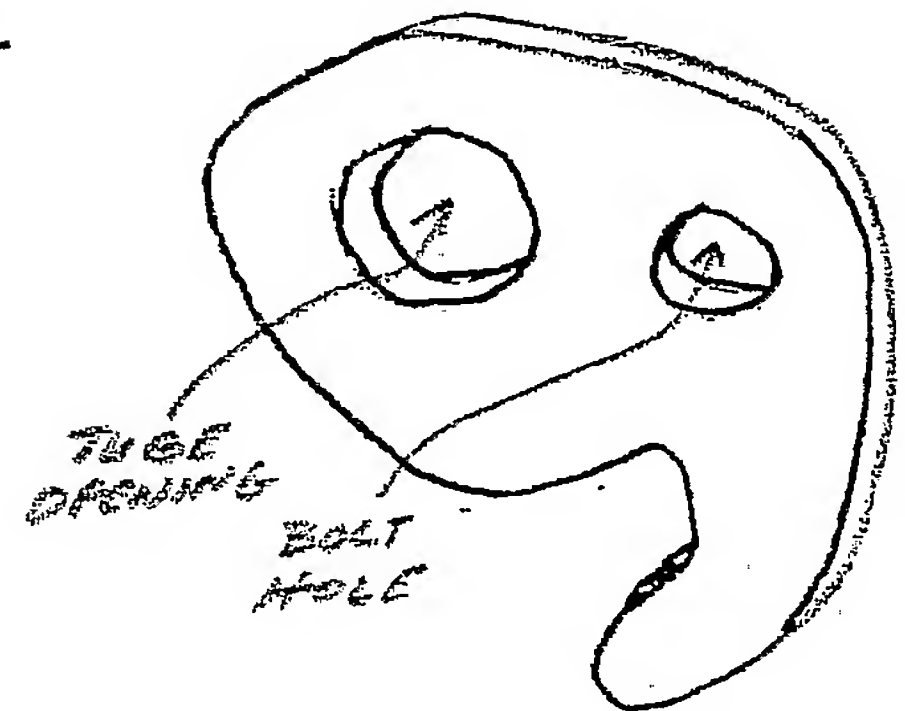


FIG. 5



